

# Bunker Hill Superfund Site 2013 Blood Lead Levels

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Panhandle Health District  
Idaho Department of Environmental Quality  
United States Environmental Protection Agency

October 17, 2013

# **Lead Health Intervention Program (LHIP) Annual Blood Lead Surveys**

- **Public health service offered by the State**
- **Not a study or experiment**
- **Box since 1974/1985**
- **Basin since 1996**

# Panhandle Health District

## LHIP Procedures

**\$30.00 cash incentive for participants that live:**

- within the **Box** and are between ***6 months and 9 years of age***, or

**\$30.00 cash incentive for participants that live:**

- within the Coeur d'Alene River **Basin** and are between ***6 months and 6 years of age***

- Prior to blood draws, the parent/legal guardian or adult participant must sign a Consent Form and complete the appropriate Questionnaire



# **Panhandle Health District**

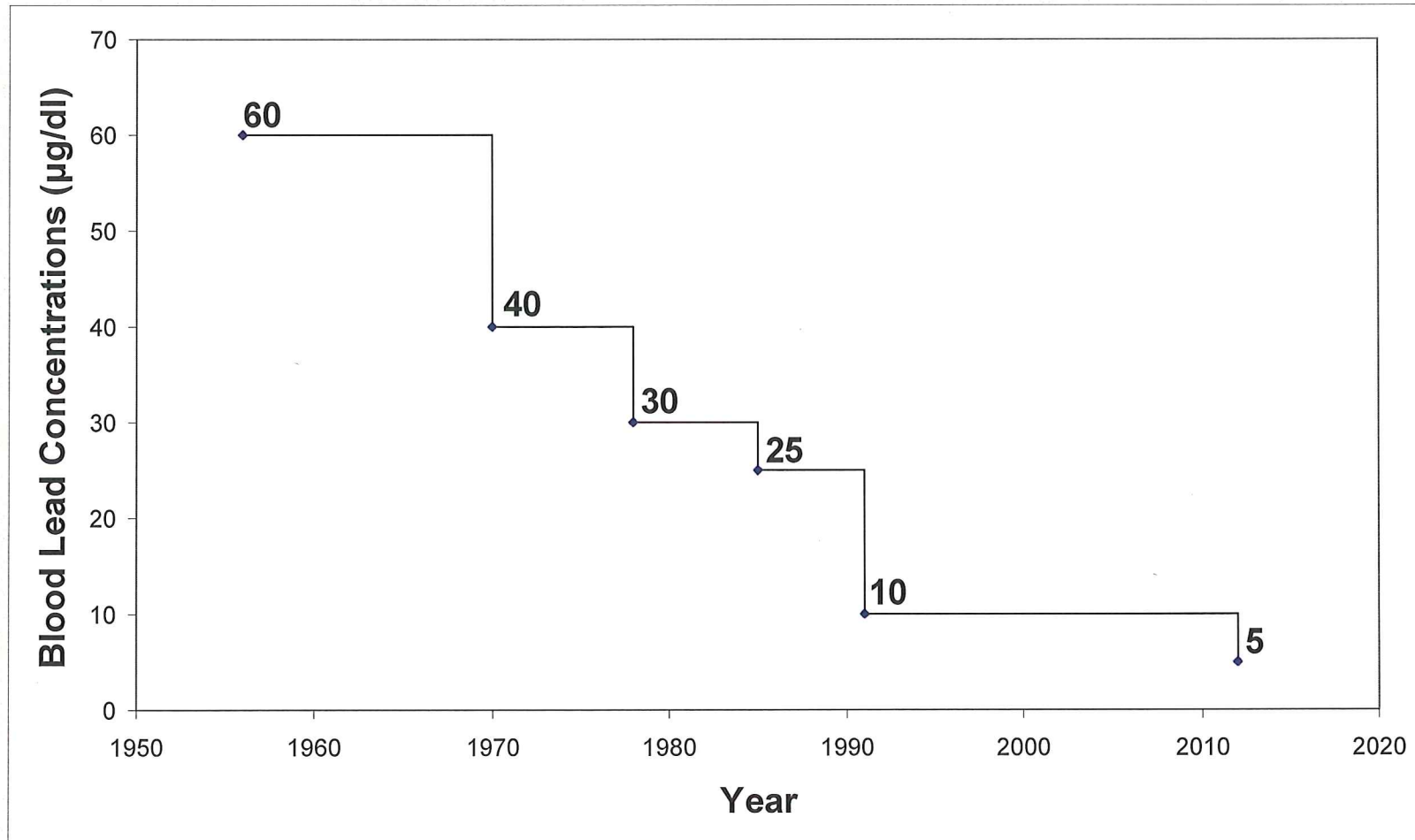
## **LHIP Procedures**

- **Screening blood test is done by skin puncture (capillary or fingerstick - FS)**
- **Results of capillary test are provided to the participant or parent immediately after analysis**



# Health Effects

# Decreasing “elevated” blood lead levels



Blood Lead Concentrations Considered to be Elevated by the Centers for Disease Control and Prevention.

\*N Engl J Med 2003; 348: p1517-26 (1950 – 1991)

\*CDC. Recommendations in “*Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention*”. (2012)

# Neurotoxic Effects

- **Neurobehavioral effects in early development persist into adolescence and young adulthood**
- **Neurocognitive effects associated blood lead levels of 5-10  $\mu\text{g}/\text{dl}$**
- **A decline of 6.2 IQ points results from a blood lead change from 1 to 10  $\mu\text{g}/\text{dl}$  (pooled results from 7 studies)**



# **Cardiovascular Effects**

- **Increase in blood pressure (hypertension)**

# **Other Organ and System Effects**

- **Renal effects**
- **Immune system effects**
- **Bone and teeth effects**
- **Heme-synthesis effects**
- **Reproductive and developmental effects**
- **Adrenal effects**
- **Liver Effects**
- **Gastrointestinal Effects**
- **Metabolism Effects**
- **Genotoxic Effects**
- **Carcinogenic Effects**

# **At Risk Populations**

- **Children**
- **Pregnant women**
- **Adults with cumulative exposure**
- **Genetically pre-disposed Individuals**



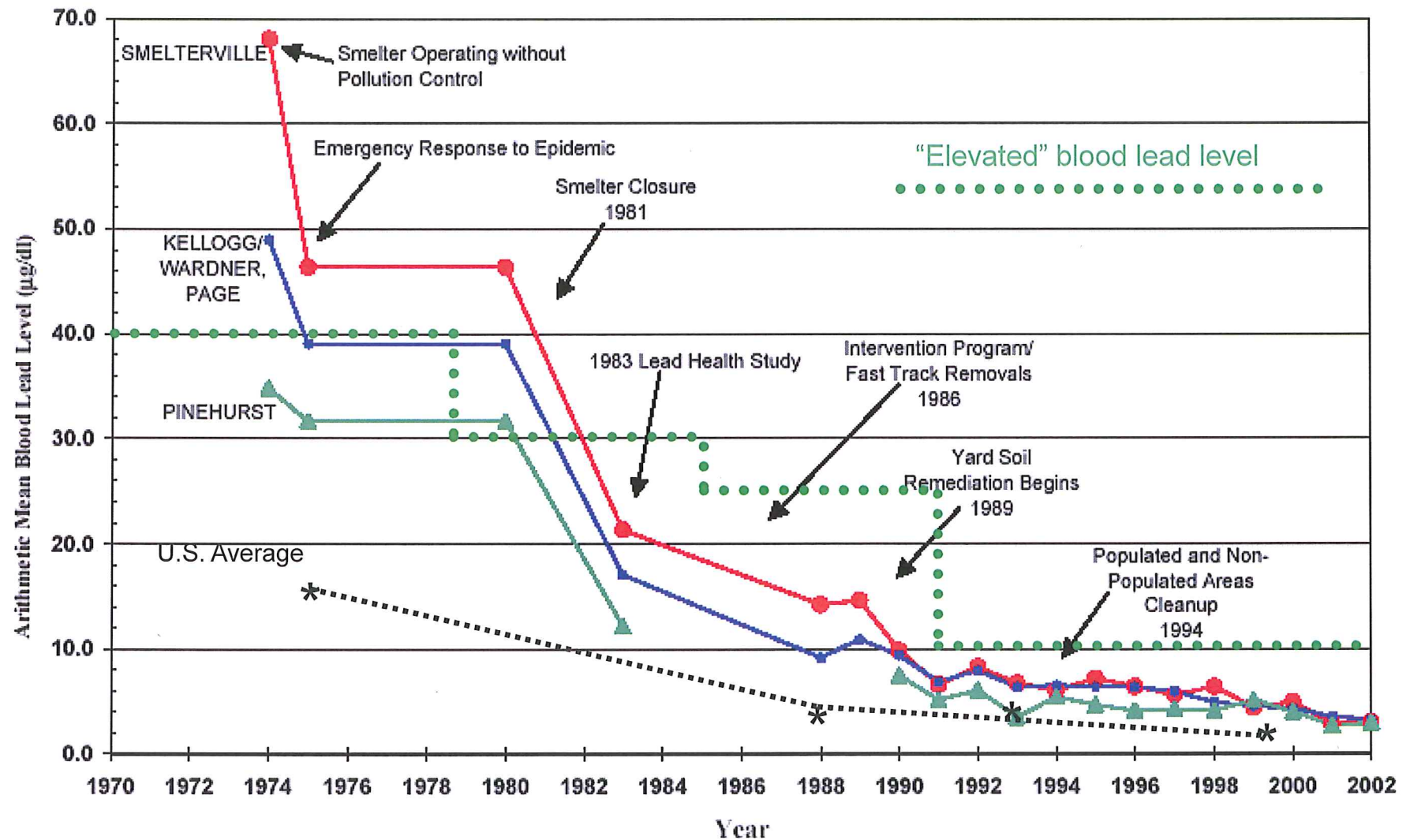
“The health effects associated with lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in the body, especially the nervous system. No safe level of lead exposure has been identified.”

– Centers for Disease Control and Prevention

# Box History

# Bunker Hill Box

## Average Blood Lead: 1974-2002

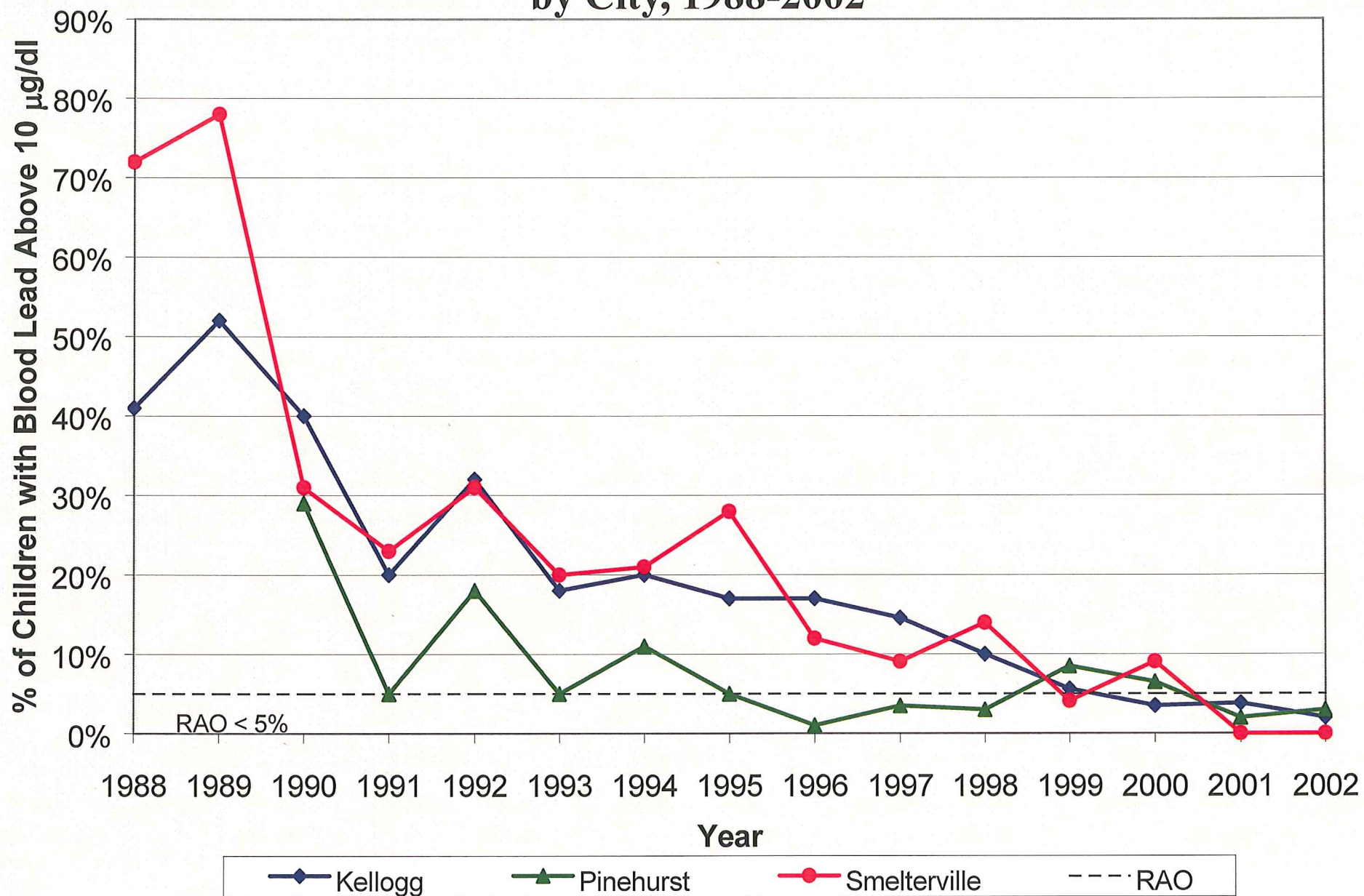




# **Bunker Hill Box Superfund Site Remedial Action Objective**

- 95% of all children in each community with blood lead levels  $<10 \mu\text{g/dl}$
- No children (i.e.,  $<1\%$ ) with blood lead levels  $\geq 15 \mu\text{g/dl}$

# Percent of Box Children with Blood Lead Levels $\geq 10$ $\mu\text{g/dl}$ , by City, 1988-2002



# Box Lead Health Intervention

## Summary Statistics 1988-1995

Year	Number of children in survey	Average blood Pb ( $\mu\text{g}/\text{dl}$ )	Number of children with blood Pb ( $\mu\text{g}/\text{dl}$ )			Percent of children $\geq 10 \mu\text{g}/\text{dl}$
			$\geq 25$	$\geq 15$	$\geq 10$	
1988*	230	9.9	7	35	105	46%
1989*	275	11.4	8	71	154	56%
1990	362	8.9	2	41	134	37%
1991	365	6.3	2	17	56	15%
1992	415	7.4	3	31	110	27%
1993	445	5.6	1	10	66	15%
1994	416	6.2	1	15	71	17%
1995	405	6.0	2	20	62	15%

\*does not include Pinehurst



# Box Lead Health Intervention Summary Statistics 1996-2013

Year	Number of children in survey	Average blood Pb (µg/dl)	Number of children with blood Pb (µg/dl)			Percent of children ≥ 10 µg/dl
			≥25	≥15	≥10	
1996	397	5.8	2	13	49	12%
1997	337	5.4	0	6	36	11%
1998	375	4.8	0	5	31	8%
1999	370	4.7	0	3	23	6%
2000	320	4.3	0	5	17	5%
2001	322	3.2	0	4	10	3%
2002	368	3.1	0	3	7	2%
2003-2012						
2013	276	2.4	0	1	2	1%

# 2013 Blood Lead Summary

## Statistics – Box (age 0-9)

Total Number of Children (N)	276
Minimum (µg/dl)	1
Maximum (µg/dl)	20
Average (µg/dl)	2.4
Standard Deviation	1.7
Geometric Mean (µg/dl)	2.2
Geometric Standard Deviation	1.6

	Number	Percentage
Children's blood lead $\geq 5$ µg/dl	10	4%
Children's blood lead $\geq 10$ µg/dl	2	1%
Children's blood lead $\geq 15$ µg/dl	1	0%



# 2013 Box Blood Lead Summary

## Statistics by Area

Area	Kellogg*	Page	Pinehurst	Smelterville	Wardner
Number	147	6	68	45	10
Min (µg/dl)	1.0	1.4	1.4	1.4	1.4
Max (µg/dl)	20	4.4	6.0	6.0	4.6
Average (µg/dl)	2.6	2.6	2.1	2.3	2.5
GeoMean (µg/dl)	2.3	2.4	1.9	2.1	2.3

\*Includes Elizabeth Park and Montgomery Gulch

# 2013 Box Blood Lead Summary

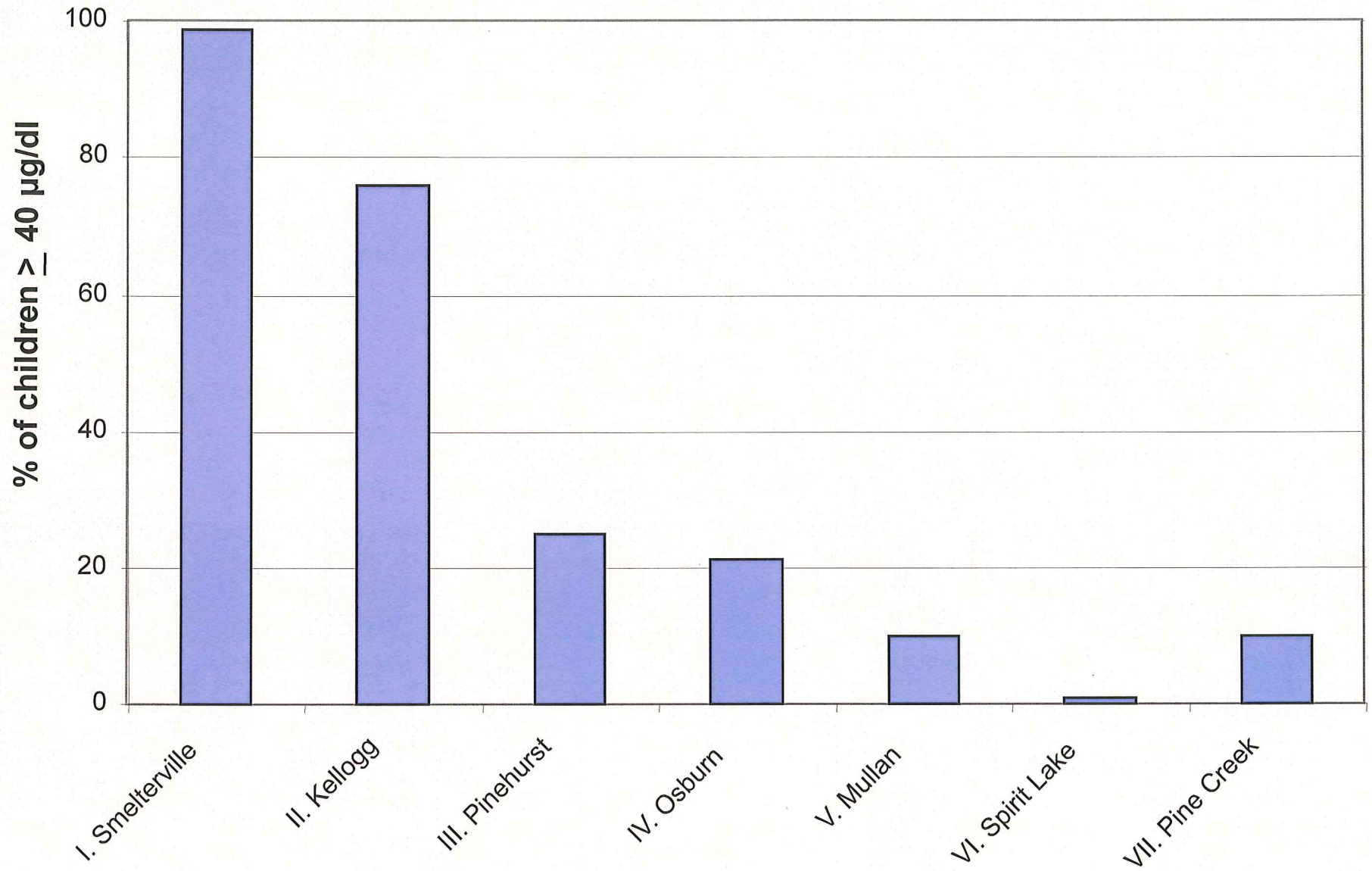
## Statistics by Age (years)

Age	1	2	3	4	5	6	7	8	9
Number	34	37	35	33	23	33	29	25	27
Min (µg/dl)	1.4	1.4	1.4	1.0	1.4	1.4	1.4	1.4	1.0
Max (µg/dl)	20	9.0	11.0	6.0	4.0	3.6	3.0	3.1	4.9
Average (µg/dl)	3.5	3.0	2.7	2.7	2.2	1.9	1.8	1.7	1.9
GeoMean (µg/dl)	2.9	2.6	2.3	2.5	2.1	1.8	1.7	1.7	1.7

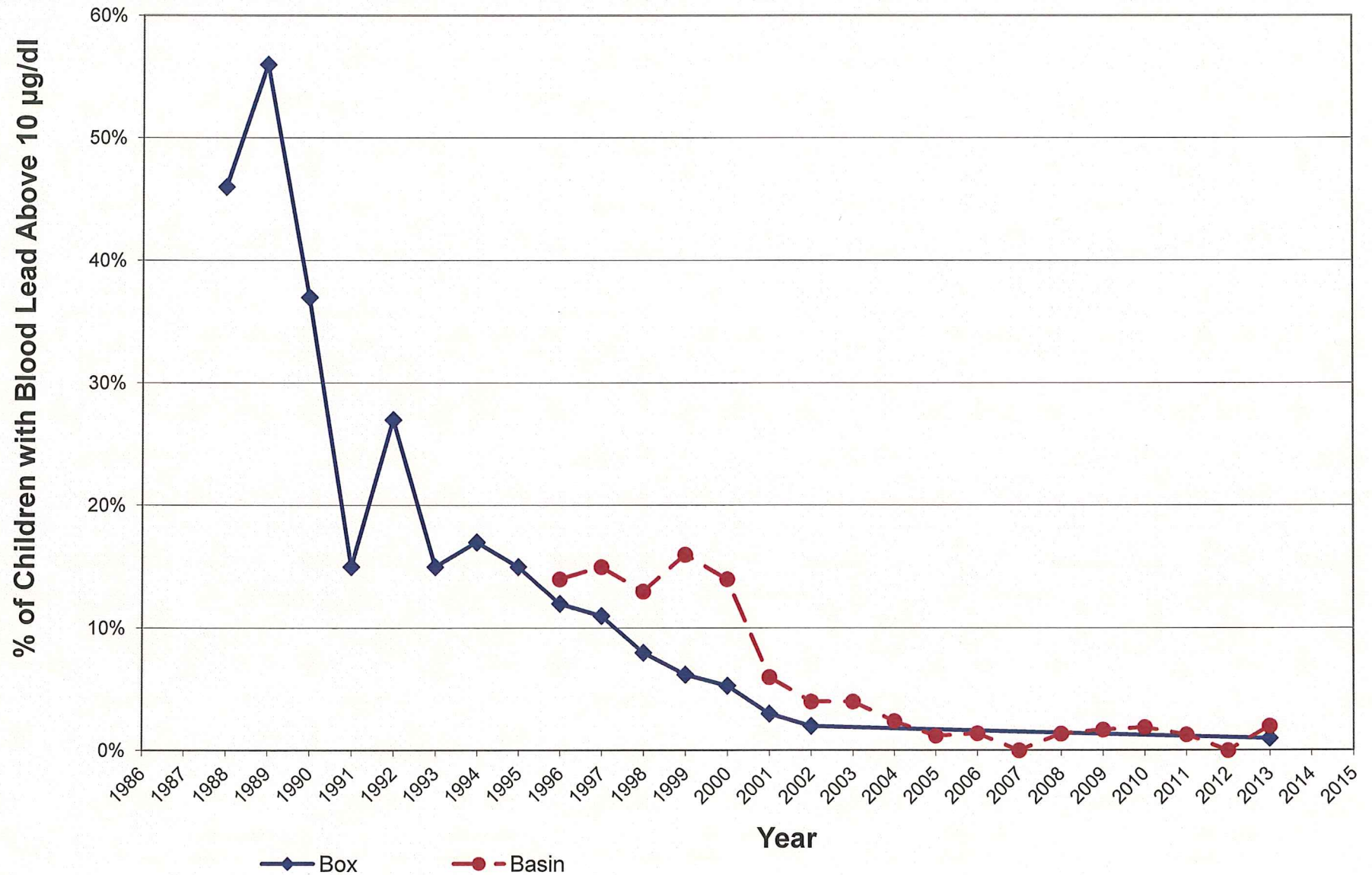


# Basin History

## Blood Lead Levels by Area, 1974



**Percent of Children with Blood Lead Levels  $\geq 10$   $\mu\text{g}/\text{dl}$ ,  
Box and Basin, 1988-2013**



# 2013 Blood Lead Summary

## Statistics – Basin (age 0-6)

Total Number of Children (N)	92
Minimum (µg/dl)	1.4
Maximum (µg/dl)	16
Average (µg/dl)	2.8
Standard Deviation	1.9
Geometric Mean (µg/dl)	2.5
Geometric Standard Deviation	1.6

	Number	Percentage
Children's blood lead $\geq 5$ µg/dl	5	5%
Children's blood lead $\geq 10$ µg/dl	2	2%
Children's blood lead $\geq 15$ µg/dl	1	1%



# Basin Blood Lead Summary by Year, 1996 - 2001 (age 0-6 only)

Year	1996	1997	1998	1999	2000	2001
Number	58	13	70	162	101*	117
Min (µg/dl)	1	2	2	1	1	1.4
Max (µg/dl)	18.0	19.0	21.0	29.0	27.0	16.0
Average (µg/dl)	5.2	6.0	6.3	6.4	5.8	4.5
GeoMean (µg/dl)	4.2	4.9	5.4	5.2	4.8	3.7

\*1 child from 2000 was removed from the summary because the associated address was outside the Basin boundaries.

# Basin Blood Lead Summary

## by Year, 1996 - 2001 (age 0-6 only)

Year	1996	1997	1998	1999	2000	2001
Number (N)	58	13	70	162	101*	117
N ≥ 10 µg/dl	8	2	9	26	14	7
% ≥ 10 µg/dl	14%	15%	13%	16%	14%	6%
N ≥ 15 µg/dl	3	1	4	12	4	2
% ≥ 15 µg/dl	5%	8%	6%	7%	4%	2%
N ≥ 20 µg/dl	0	0	2	4	1	0
% ≥ 20 µg/dl	0%	0%	3%	2%	1%	0%

\*1 child from 2000 was removed from the summary because the associated address was outside the Basin boundary.



# Basin Blood Lead Summary

## by Year, 2002 - 2007 (age 0-6 only)

Year	2002	2003	2004	2005	2006	2007
Number	103	75	80*	81	69	71
Min (µg/dl)	1.4	1	1.4	1.4	1.4	1.4
Max (µg/dl)	13.0	17.1	16.7	12.0	10.0	9.0
Average (µg/dl)	3.7	4.1	3.9	2.9	2.8	2.9
GeoMean (µg/dl)	3.2	3.4	3.4	2.3	2.4	2.6

\*2 children from 2004 were removed from the summary because the associated addresses were outside the Basin boundaries.

# Basin Blood Lead Summary by Year, 2002 - 2007 (age 0-6 only)

Year	2002	2003	2004	2005	2006	2007
Number (N)	103	75	80*	81	69	71
N $\geq$ 10 $\mu\text{g/dl}$	4	3	2	1	1	0
% $\geq$ 10 $\mu\text{g/dl}$	4%	4%	3%	1%	1%	0%
N $\geq$ 15 $\mu\text{g/dl}$	0	2	1	0	0	0
% $\geq$ 15 $\mu\text{g/dl}$	0%	3%	1%	0%	0%	0%
N $\geq$ 20 $\mu\text{g/dl}$	0	0	0	0	0	0
% $\geq$ 20 $\mu\text{g/dl}$	0%	0%	0%	0%	0%	0%

\*2 children from 2004 were removed from the summary because the associated addresses were outside the Basin boundaries.



# Basin Blood Lead Summary by Year, 2008 - 2013 (age 0-6 only)

Year	2008	2009	2010	2011	2012	2013
Number	73	175	108	75	83	92
Min (µg/dl)	1.4	1.4	1.4	1.4	1.0	1.4
Max (µg/dl)	14.0	10.0	20.0	12.0	8.0	16
Average (µg/dl)	2.4	3.1	2.5	3.1	3.3	2.8
GeoMean (µg/dl)	2.1	2.7	2.1	2.6	3.1	2.5

# Basin Blood Lead Summary by Year, 2008 - 2013 (age 0-6 only)

Year	2008	2009	2010	2011	2012	2013
Number (N)	73	175	108	75	83	92
N $\geq$ 10 $\mu\text{g/dl}$	1	3	2	1	0	2
% $\geq$ 10 $\mu\text{g/dl}$	1%	2%	2%	1%	0%	2%
N $\geq$ 15 $\mu\text{g/dl}$	0	0	1	0	0	1
% $\geq$ 15 $\mu\text{g/dl}$	0%	0%	0.9%	0%	0%	1%
N $\geq$ 20 $\mu\text{g/dl}$	0	0	1	0	0	0
% $\geq$ 20 $\mu\text{g/dl}$	0%	0%	0.9%	0%	0%	0%



# 2013 Basin Blood Lead Summary

## Statistics by Area

Area	Burke (Ninemile)	Mullan	Osburn	Wallace
Number	7	2	29	2
Min (µg/dl)	2.2	2.0	1.4	1.6
Max (µg/dl)	4.4	2.6	4.8	3.0
Average (µg/dl)	3.0	2.3	2.5	2.3
GeoMean (µg/dl)	2.9	2.3	2.3	2.2

# 2013 Basin Blood Lead Summary

## Statistics by Area

Area	Kingston	Lower Basin	Side Gulches	Silverton
Number	21	2	17	12
Min (µg/dl)	1.4	2.2	1.4	1.4
Max (µg/dl)	16	5.0	3.9	4.9
Average (µg/dl)	3.7	3.6	2.3	2.9
GeoMean (µg/dl)	2.8	3.3	2.3	2.7



# 2013 Basin Blood Lead Summary

## Statistics by Age (years)

Age	1	2	3	4	5	6
Number	14	18	11	14	20	15
Min (µg/dl)	1.4	1.4	1.4	1.4	1.4	1.4
Max (µg/dl)	16	7.0	3.9	4.0	6.0	5.0
Average (µg/dl)	4.3	2.9	2.3	2.3	2.8	2.4
GeoMean (µg/dl)	3.3	2.6	2.1	2.3	2.6	2.3

# Percentage of Parcels that have Consented and Refused Sampling

	Consented	Refused
Mullan	99%	1%
Wallace	98%	2%
Silverton	98%	2%
Osburn	99%	1%
Side Gulches	97%	3%
Pine Creek	98%	2%
Kingston	97%	3%
Cataldo	93%	7%
Rose Lake	92%	8%
Medimont	85%	15%
Lane	84%	16%
Harrison	93%	7%
Total	97%	3%

Consents and refusals received from 2004 through August 2013.